UNO-2050

GX1-300 Universal Network Controller with 2 x LAN, 2 x RS-232, 2 x isolated RS-232/422/485, 16 x isolated DI/O

User's Manual

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CHAPTER 1

UNO-2050 Overview

This chapter gives background information on the UNO-2050. It shows you the UNO-2050 overview and specifications.

Sections include:

- Introduction
- Hardware Specifications
- Safety Precautions
- UNO-2050 Series
- Chassis Dimension

1.1 Introduction

Are you looking forward to a suitable embedded Application Ready Platform (ARP) that could shorten your development time and offer rich networking interfaces to fulfill your extensive needs in different kind of projects? Advantech Universal Network Controller (UNO-2000 series) is your ANSWER concentrating the services on Network-enabled Application Ready Platform total solution.

Leveraging field-approved and worldwide-awareness real-time OS technology, Advantech UNO-2000 series provides Windows CE .NET ready solution and support several standard networking interfaces, such as Ethernet, Wireless LAN, RS-232/422/485 and so on. Because of its openness, great expansion capability and reliable design – fanless and diskless, Advantech UNO-2000 series becomes an ideal embedded platform to implement custom applications in diversified applications.

1.2 Hardware Specifications

CPU: NS Geode GX1-300 MHz

Chipset: NS CS5530A

BIOS: AWARD 256 KB FLASH BIOS

RAM: 64/128 MB SDRAM on board

VGA: Supports VGA and VESA

- Display memory: 1 ~ 4 MB share memory, set in BIOS
- CRT display mode: Non-interlaced CRT monitors resolutions up to 1280 x 1024 @ 256 colors or 1024 x 768 @ 16 bpp
- DB-15 VGA connector

Serial Port: Two standard RS-232 ports

- Data bits: 5, 6, 7, 8
- Stop bits: 1, 1.5, 2
- Parity: none, even, odd
- Speed: 50 ~ 115.2 Kbps
- Data signals: TxD, RxD, RTS, CTS, DTR, DSR, DCD, RI, GND
- Max data distance: 50 feet (15.2 meters)

Serial port: 2 x 5-wire RS-232/422/485

- Automatic RS-485 data flow control
- 2000 V_{DC} surge protection and 1500 V_{DC} isolation
- Stop bits: 1, 1.5, 2
- Parity: non, even, odd
- RS-232 Speed: 50 ~ 230.4 Kbps
- RS-422/485 speed: 50 ~ 921.6 Kbps
- 5-wire RS-232 data signals: TxD, RxD, RTS, CTS, GND
- RS-422 data signals: TxD+, TxD-, RxD+, RxD-, GND

- RS-485 data signals: DATA+, DATA-, GND
- RS-232 max data distance: 50 feet (15.2 meters)
- RS-422/485 max data distance: 4000 feet (1200 meters)
- Plug-in screw-terminal block: Accepts 0.5 mm^2 to 2.5 mm^2 , 1 - #12 or 2 - #14 to #22 AWG

Ethernet Port: Dual 10/100Base-T Ethernet

- LAN chip: Realtek 8139C chipset supports
- LED on the front side

8-ch isolated digital input: (DI0~DI7)

- 2,000 V_{DC} isolation, 2000 V_{DC} ESD protection and 70 V_{DC} over-voltage protection
- 0 ~ 50 V_{DC} input range and 10 KHz speed
- Input Voltage
  - Logic 0: 0 ~ 3 V_{DC}
  - Logic 1: 10 ~ 50 V_{DC}
- Input Current
  - 10 V_{DC}: 1.7 mA (typical)
  - 12 V_{DC}: 2.1 mA (typical)
  - 24 V_{DC}: 4.4 mA (typical)
  - 48 V_{DC}: 9.0 mA (typical)
  - 50 V_{DC}: 9.4 mA (typical)
- Interrupt handling capability
- Plug-in screw-terminal block: Accepts 0.5 mm^2 to 2.5 mm^2 , 1 - #12 or 2 - #14 to #22 AWG

8-ch isolated digital output: (DO0 ~ DO7)

- 2,000 V_{DC} isolation and 200 mA max / channel sink current
- Keep output status after system hot reset
- 5 ~ 40 V_{DC} output range and 10 KHz speed
- Plug-in screw-terminal block: Accepts 0.5 mm^2 to 2.5 mm^2 , 1 - #12 or 2 - #14 to #22 AWG

Two 16-bit counters/timers:

- Counter source: DI6 & DI7, Pulse output: DO6 & DO7
- Can be cascaded as one 32-bit counter/timer
- Down counting, Preset counting value
- Interrupt handling, speed: 40 KHz
- Timer time base: 100 KHz, 10 KHz, 1 KHz, 100 Hz

SSD: One Type I / Type II CompactFlash™ card slot inside the chassis

HDD: Offer HDD extension kit for installation of one standard 2.5" HDD.

LED: One power LED, one IDE LED, one programmable LED and one programmable buzzer

Keyboard/Mouse connector: Mini-DIN connector supports PS/2 keyboard and a PS/2 mouse

Power supply voltage: 9 ~ 36 V_{DC} , reversed wiring protection

Power Consumption: 0.6 A max under +24 V power input or 1.2 A max.

under +12 V power input

Power Requirement: 1A typical under +24 V power input or 1.5 A typical under +12 V power input

Operating temperature: -10 ~ 55°C (14 ~ 131°F)

Chassis size: 164.8 mm (W) x 106.5 mm (L) x 35.5 mm (H) (6.5" x 4.2" x 1.4")

Weight: 0.8 kg

1.3 Safety Precautions

The following sections tell how to make each connection. In most cases, you will simply need to connect a standard cable. All of the connector pin assignments are shown in Appendix A.

Warning! *Always disconnect the power cord from your chassis whenever you are working on it. Do not connect while the power is on. A sudden rush of power can damage sensitive electronic components. Only experienced electronics personnel should open the chassis.*

Caution! *Always ground yourself to remove any static electric charge before touching UNO-2050. Modern electronic devices are very sensitive to static electric charges. Use a grounding wrist strap at all times. Place all electronic components on a static-dissipative surface or in a static-shielded bag..*

1.4 UNO-2050 Series

There are two products in UNO-2050 series listed as below:

- **UNO-2050:** UNO-2050 hardware platform
- **UNO-2050CE:** UNO-2050 hardware platform with Windows CE OS (built in 32MB CompactFlash™ card)

Packing list

Before installing your board, make sure that the following materials have been received:

Common parts:

- Warranty certificate
- Software Supporting CD-ROM
- 6P-6P-6P 20cm KB and PS/2 Mouse Y cable (P/N: 1700060202)
- Plug-in Block 2P Female (P/N 1652002205)
- DIN-rail mounting accessory (1997001110, 1997001120, 1997001130, 1997001140)

For UNO-2050CE only:

- Built in 32 MB CompactFlash™ card with Microsoft Windows CE OS
- End User License Agreement for Windows CE

If any of these items are missing or damaged, contact your distributor or sales representative immediately.

1.5 Chassis Dimensions

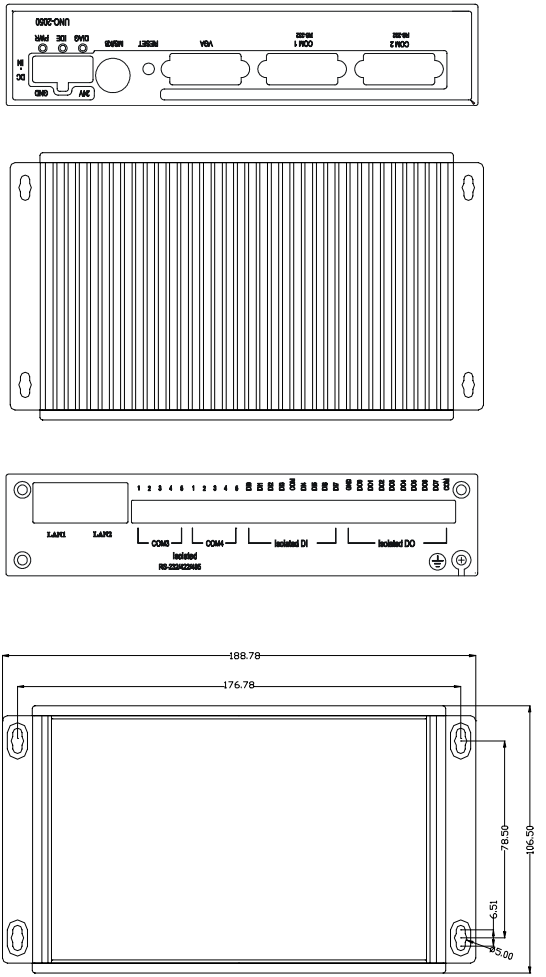


Figure 1-1: Chassis dimensions

CHAPTER 2

Hardware Functionality

This chapter shows how to set up the UNO-2050's hardware functions, including connecting peripherals, switches and indicators.

Sections include:

- UNO-2050 Peripherals
- COM 1 ~ COM 2: RS-232 Interfaces
- COM 3 ~ COM 4: Isolated 5-wire RS-232/422/485 Interfaces
- On-board Isolated Digital Input
- On-board Isolated Digital Output
- On-board Isolated Counter/Timer
- LAN: Ethernet Connector
- Power Connector
- LED Indicators
- PS/2 Keyboard and Mouse Connector
- VGA: VGA Display Connector
- Programmable LED and Buzzer for System Diagnosis
- RESET: Reset Button

2.1 UNO-2050 Peripherals

The following two figures show the connectors on UNO-2050. The following sections give you detail information about function of each peripheral.

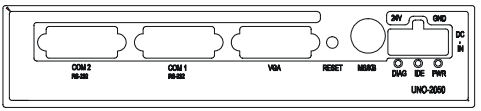


Figure 2-1: UNO-2050 front panel

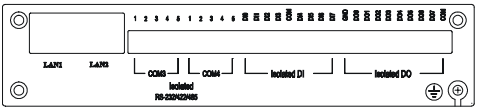


Figure 2-2: UNO-2050 rear panel

2.2 COM1 ~ COM2: RS-232 Interfaces

The UNO-2050 offers two standard RS-232 serial communication interface ports, and they are COM1 and COM2. Please refer to A.2 for its pin assignments.

2.3 COM3 ~ COM4: Isolated 5-wire RS-232/422/485 Interfaces

The UNO-2050 offers two isolated 5-wire RS-232/422/485 serial communication interface ports, and they are COM3 and COM4. The connector type of COM3 and COM4 is screw-terminal block that it's easy for wiring without additional daughter board. Each port can be configured individually to either RS-232, RS-422 or RS-485 by using on-board jumpers (see Appendix A.3), and Table 2-1 lists the default setting of each port.

Table 2-1: Serial ports default setting

COM Port	Default Setting
COM3	RS-485
COM4	RS-485

16C954 UARTs with 128-byte standard

Advantech UNO-2050 comes standard with Oxford OX16PCI964 UARTs containing 128 bytes FIFOs. These upgraded FIFOs greatly reduce CPU overhead and are an ideal choice for heavy multitasking environments.

Automatic Data Flow Control Function for RS-485

In RS-485 mode, UNO-2050 automatically senses the direction of incoming data and switches its transmission direction accordingly. Therefore no handshaking signal (e.g. RTS signal) is necessary. This feature lets you simply and quickly build an RS-485 network with just two wires. More importantly, application software previously written for half duplex RS-232 environments can be maintained without need for modification.

IRQ and Address Setting

The IRQ and I/O address range are both assigned by BIOS. COM3, COM4 serial ports and on-board digital I/O use the same IRQ.

2.4 On-board Isolated Digital Input

The UNO-2050 has 8 isolated digital input channels designated DI0~DI7.

Pin Assignment

The connector type of UNO-2050 is plug-in screw terminal block that enables you to connect to field I/O devices directly without additional accessories. Figure 2-3 and Table 2-2 shows its pin assignment as well as signal description.

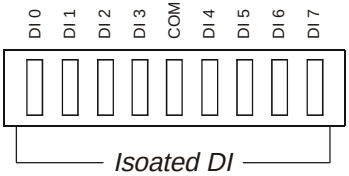


Figure 2-3: Digital input connector pin assignments

Table 2-2: Digital input connector signal description

Signal Name	Reference	Direction	Description
DI <0...7>	COM	Input	Isolated digital input signals
COM	-	Input	External common input of DI

Isolated Inputs

Each of isolated digital input channels accepts 10 ~ 50 V_{DC} voltage inputs, and accepts bi-directional input. It means that you can apply positive or negative voltage to an isolated input pin (Vin). All eight channels share one common pin (COM). Figure 2-4 shows how to connect an external input source to one of the UNO-2050's isolated input channels.

Please note that DI4 and DI5 may be configured as Counter 0 and Counter 1's gate control pins; DI6 and DI7 may be configured as Counter 0 and Counter 1's clock input pins. Please refer to "section 2.6" for detail

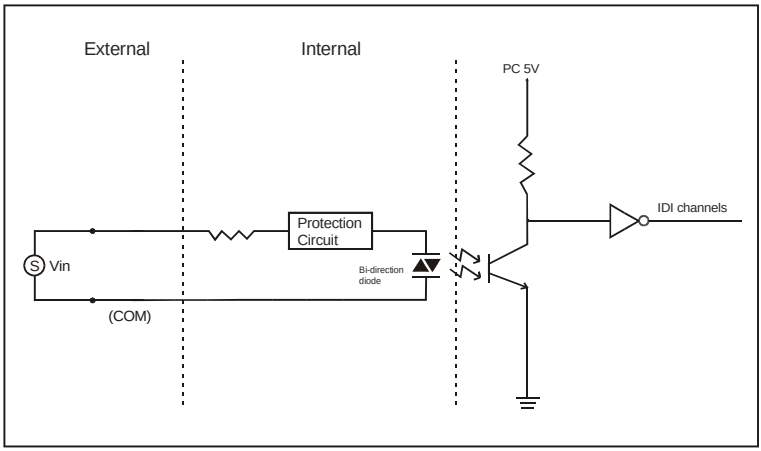


Figure 2-4: Isolated digital input connection

Interrupt function of the DI signals

DI0 and DI1 can be used to generate hardware interrupts. A user can setup the configuration of interrupts by programming the interrupt control register.

The channels are connected to the interrupt circuitry. Users can disable/enable interrupt function, select trigger type or latch the port data by setting the Interrupt Control Register of the UNO-2050. When the interrupt request signals occur, then the software will service these interrupt requests by ISR (Interrupt Service Routine). The multiple interrupt sources provide the card with more capability and flexibility.

IRQ Level

The IRQ level is set automatically by the system BIOS. There is no need for users to set the IRQ level. Only one IRQ level is used although it has several interrupt sources.

Interrupt Control Register

The Interrupt Control Register controls the function and status of each interrupt signal source. Table 2-3 shows the bit map of the Interrupt Control Register. The register is readable/writable register. While being written, it is used as a control register; and while being read, it is used as a status register.

Table 2-3: Interrupt control register bit map

Base Address		7	6	5	4	3	2	1	0
Base+02H	R/W	Interrupt Enable Control/Status Register							
								DI1EN	DI0EN
Base+03H	R/W	Interrupt Triggering Edge Control/Status Register							
								DI1TE	DI0TE
Base+07H	R/W	Interrupt Flag/Clear Register							
								DI1F	DI0F

DI0EN & DI1EN: DI0 & DI1 Interrupt disable/enable control bit

DI0TE & DI1TE: DI0 & DI1 Interrupt triggering edge control bit

DI0F & DO1F: DI0 & DI1 interrupt flag bit

Interrupt Enable Control Function

The user can choose to enable or disable the interrupt function by writing its corresponding value to the interrupt disable/enable control bit in the interrupt control register, as shown in Table 2-4

Table 2-4: Interrupt disable/enable control bit values

DI0EN & DI1EN	Interrupt disable/enable control
0	Disable
1	Enable

Interrupt Triggering Edge Control

The interrupt can be triggered by a rising edge or a falling edge of the interrupt signal, as determined by the value in the interrupt triggering edge control bit in the interrupt control register, as shown in Table 2-5.

Table 2-5: Interrupt triggering edge control bit values

DI0TE & DI1TE	Triggering edge of interrupt signal
0	Falling edge trigger
1	Rising edge trigger

Interrupt Flag Bit

The interrupt flag bit is a flag indicating the status of an interrupt. It is a readable/writable bit. To find the status of the interrupt, you have to read the bit value; to clear the interrupt, you have to write “1” to this bit. This bit must first be cleared to service the next coming interrupt.

Table 2-6: Interrupt flag bit values

DI0F & DI1F		Interrupt Status
Read	0	No interrupt
	1	Interrupt occur
Write	0	Don’t care
	1	Clear interrupt

2.5 On-board Isolated Digital Output

The UNO-2050 has 8 isolated digital output channels designated DO0~DO7.

Pin Assignment

The connector type of UNO-2050 is plug-in screw terminal block that enables you to connect to field I/O devices directly without additional accessories. Figure 2-5 and Table 2-7 shows its pin assignment as well as signal description.

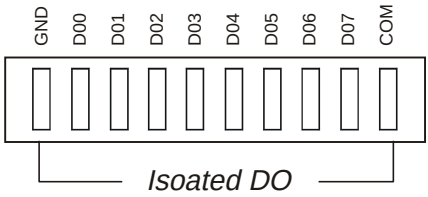


Figure 2-5: Digital output connector pin assignments

Table 2-7: Digital output connector signal description

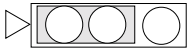
Signal Name	Reference	Direction	Description
DO <0...7>	GND	Output	Isolated digital output signals
COM	-	Input	External common output of DO
GND	-	-	Isolated ground

Power On Configuration

Default configuration after power on or hardware reset is to set all the isolated digital output channels to open status (the current of the load can't be sink) so that users need not worry about damaging external devices during system startup or reset.

When the system is hot reset, then the status of isolated digital output channels are selected by jumper JP12. Table 2-8 shows the configuration of jumper JP12.

Table 2-8: JP12 Digital output power on configuration

JP12	Power on configuration after hot reset
	Default configuration
	Keep last status after hot reset

Isolated Outputs

Each of isolated output channels comes equipped with a Darlington transistor. All eight output channels share common collectors and integral suppression diodes for inductive loads.

Please note that if an external voltage (5 ~ 40 V_{DC}) is applied to an isolated output channel while it is being used as an output channel, the current will flow from the external voltage source to the UNO-2050. Please take care that the current through each DO pin not exceed 200 mA.

Figure 2-6 shows how to connect an external output load to the UNO-2050's isolated outputs.

Please note that DO6 and DO7 may be configured as Counter 0 and Counter 1's output pins, please refer to "section 2.6" for detail.

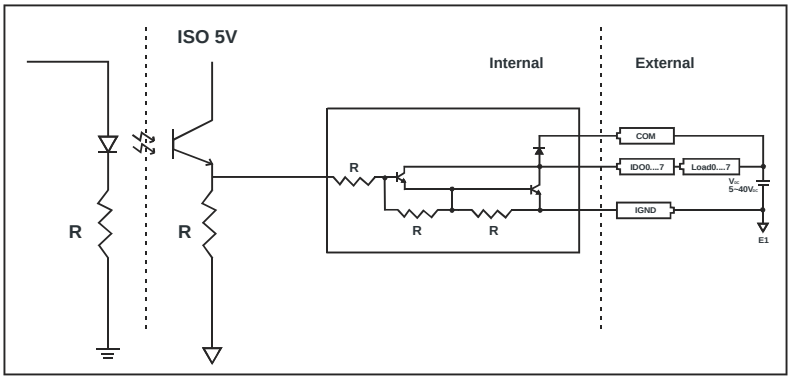


Figure 2-6: Isolated digital output connection

2.6 On-board Isolated Counter/Timer

The UNO-2050 uses one 82C54 programmable timer/counter chip that includes three independent 16-bit down counters: counter 0, counter 1 and counter 2. Counter 0 and counter 1 are for users, and counter 2 is specified for the system and can't be used by user. Each counter has clock input, gate input and pulse output. They can be programmed to count from 2 up to 65535 or cascaded into one 32-bit counter.

The UNO-2050 has 2 isolated counter input channels designated DI6 and DI7 or 2 isolated timer output channels designated DO6 and DO7. Therefore, you can set each counter of 82C54 as counter function or timer function.

Counter/Timer Control Register

The Counter/Timer Control Register controls the function and status of each counter/timer signal source. Table 2-9 shows the bit map of the Counter/Timer Control Register. The register is readable/writable register. While being written, it is used as a control register; and while being read, it is used as a status register.

Table 2-9: Counter/Timer control register bit map

Base Address		7	6	5	4	3	2	1	0
Base+07H	R/W	Interrupt Flag/Clear Register							
						CTR1F	CTR0F		
Base+08H	R/W	82C54 Chip Counter0 Register							
Base+09H	R/W	82C54 Chip Counter1 Register							
Base+0BH	R/W	82C54 Chip Control Register							
Base+0CH	R/W	Counter0 Start Control / Output Status Register							
					CTR0Out				CTR0Gate
Base+0DH	R/W	Counter1 Start Control / Output Status Register							
					CTR1Out				CTR1Gate
Base+0EH	R/W	Counter0 Setting Register							
						CTR0IntSet	CTR0OutSet	CTR0GateSet	CTR0CLKSet
Base+0FH	R/W	Counter1 Setting Register							
			CTR32Set	S1	S0	CTR1IntSet	CTR1OutSig	CTR1GateSig	CTR1CLKSig

CTR0F & CTR1F: Counter 0 & Counter 1 interrupt flag bit

CTR0Gate & CTR1Gate: Counter 0 and Counter 1 gate control bit

CTR0Out & CTR1Out: Counter 0 and Counter 1 output status bit

CTR0CLKSet & CTR1CLKSet: Counter 0 and Counter 1 clock source control bit

CTR0GateSet & CTR1GateSet: Counter 0 and Counter 1 gate source control bit

CTR0OutSet & CTR1OutSet: Counter 0 and Counter 1 output destination control bit

CTR0IntSet & CTR1IntSet: Counter 0 and Counter 1 interrupt control bit

S0 & S1: Counter 0 and counter 1 internal clock control bit
CTR32Set: Cascaded 32-bit counter control bit

Counter 0 Function Block

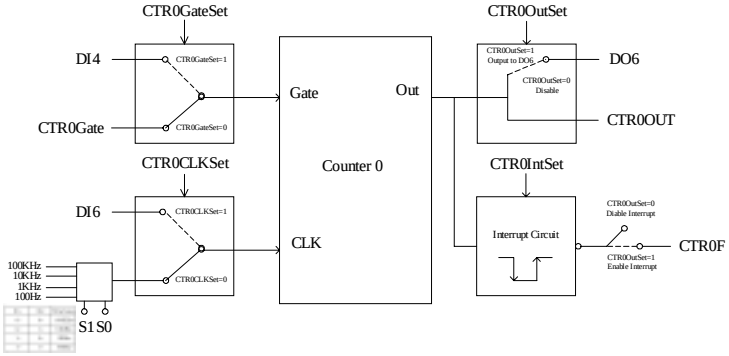


Figure 2-7: Counter 0 function block

Counter 1 Function Block

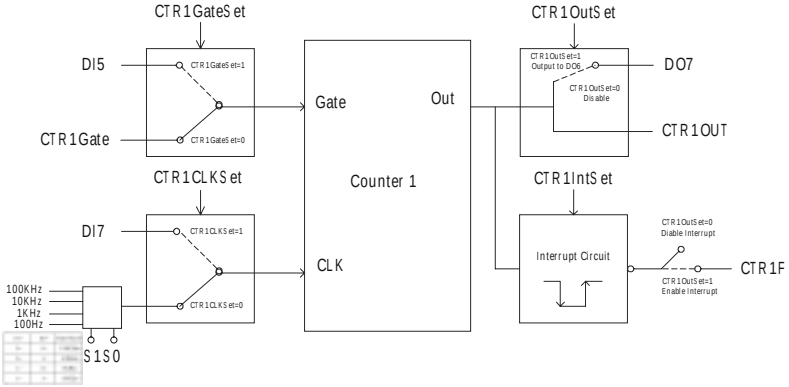


Figure 2-8: Counter 1 function block

32-bit Counter Function Block (CTR32Set=1)

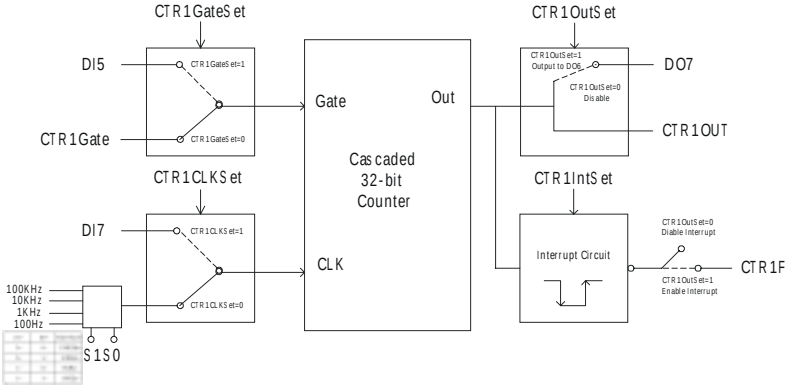


Figure 2-9: 32-bit Counter function block

Counter clock source

There are two clock sources available for the user counters by setting counter clock control bits - CTR0CLKSet and CTR1CLKSet.

Table 2-10 Counter clock source control bit

Counter clock control bit		
CTR0CLKSet	0	Internal clock (default)
	1	External clock from digital input 6 (DI6) channel
CTR1CLKSet	0	Internal clock (default)
	1	External clock from digital input 7 (DI7) channel

Counter internal clock

There are four frequency options to choose according to applications, and it's set by internal clock control bits - S0 and S1.

Table 2-11 Counter internal clock control bit

S1	S0	Time base
0	0	100KHz (default)
0	1	10 KHz
1	0	1 KHz
1	1	100 Hz

Counter gate source

The gate sources you select determine what kind of gate input signal to enable your counter/timer when receiving clock input. There are two gate sources available for the user counters by setting gate source control bits - CTR0GateSet and CTR1GateSet.

Table 2-12 Counter gate source control bit

Gate Source control bit		
CTR0GateSet	0	Gate source from "CTR0Gate" control bit (Default)
	1	Gate source from digital input 4 (DI4) channel
CTR1GateSet	0	Gate source from "CTR1Gate" control bit (Default)
	1	Gate source from digital input 5 (DI5) channel

Counter output destination

You can choose the output destination of counter 0 and counter 1 by setting "Output Destination control bits" - CTR0OutSet and TR1OutSet.

Table 2-13 Counter output destination

Output Destination control bit		
CTR0OutSet	0	Output destination to "CTR0Out" status bit (Default)
	1	Output destination to "CTR0Out" status bit and digital output 6 (DO6) channel
CTR1OutSet	0	Gate destination to "CTR1Out" status bit. (Default)
	1	Output destination to "CTR1Out" status bit and digital output 7 (DO7) channel

Counter interrupt flag

The interrupt flag bit is a flag indicating the status of an interrupt. It is a readable/writable bit. To find the status of the interrupt, you have to read the bit value; to clear the interrupt, you have to write “1” to this bit. This bit must first be cleared to service the next coming interrupt. Besides, you can choose if counter 0 or counter 1 generate interrupt signal by configuring “CTR0IntSet” and “CTR1IntSet” control bit.

Table 2-14: Counter interrupt flag control bit

CTR0F, CTR1F		Counter Interrupt Status
Read	0	No interrupt
	1	Interrupt occur
Write	0	Don’t care
	1	Clear interrupt
CTR0IntSet, CTR1IntSet		Counter Interrupt Control
0		Disable (Default)
1		Enable

Cascaded 32-bit Counter

You can also cascade counter 0 and counter 1 together as one 32-bit counter/timer, and it’s configured by the control bit - CTR32Set.

Table 2-15: 32-bit counter control bit

32-bit counter control bit	
0	Disable (Default)
1	Cascade counter 0 and counter 1 into one 32-bit counter

2.7 LAN: Ethernet Connector

The UNO-2050 is equipped with two Realtek RTL8139C Ethernet LAN controller that is fully compliant with IEEE 802.3u 10/100Base-T CSMA/CD standards. The Ethernet port provides a standard RJ-45 jack on board, and LED indicators on the front side to show its Link (Yellow LED) and Active (Green LED) status. Please refer to A.4 for its pin assignments.

2.8 Power Connector

The UNO-2050 comes with a Phoenix connector that carries 9 ~ 36 V_{DC} external power input, and features reversed wiring protection. Therefore, it will not cause any damage to the system by reversed wiring of ground line and power line. Please refer to A.5 for its pin assignments.

2.9 LED Indicators

There are two LEDs on the UNO-2050 front panel for indicating system status: PWR LED is for power status and IDE LED is for IDE bus status.

2.10 PS/2 Keyboard and Mouse Connector

The UNO-2050 provides a PS/2 keyboard and PS/2 mouse connector. A 6-pin mini-DIN connector is located on the panel of the UNO-2050. The UNO-2050 comes with an adapter to convert from the 6-pin mini-DIN connector to two 6-pin mini-DIN connectors for PS/2 keyboard and PS/2 mouse connection. Please refer to Appendix A.6 for its pin assignments.

2.11 VGA: VGA Display Connector

The UNO-2050 provides a VGA controller for a high resolution VGA interface. It supports VGA and VESA, up to 1280 x 1024 @ 8 bpp and 1024 x 768 @ 16bpp resolution and up to 4 MB share memory. The VGA interface is reserved for system testing and debugging.

2.12 Programmable LED and Buzzer for System Diagnosis

In a headless application (an application without monitor display), it is always a big problem to know the system status. Another PC may be needed to monitor headless device status via RS-232 or Ethernet. In order to solve this problem, UNO-2050 offers a programmable LED indicator and buzzer. Hence, they can be programmed to show a system's status by LED indicator flickering and buzzer alarm.

Table 2-16: LED and Buzzer control register bit map

Base+10H	R/W	LED Control Register							
							LEDS1	LEDS0	LEDEn
Base+11H	R/W	Buzzer Control Register							
							SPKS1	SPKS0	SPKEn

LED and Buzzer Control Register

LEDEn: Enable LED flickering

LEDS0 and LEDS1: LED flickering speed setting bit

SPKEn: Enable buzzer alarming

SPKS0 & SPKS1: Buzzer alarming setting bit

Table 2-17: Programmable LED control bit

LED flickering status	LEDS1	LEDS0
Light on	0	0
Fast flickering	0	1
Normal flickering	1	0
Slow flickering	1	1

Table 2-18: Programmable Buzzer control bit

Buzzer alarming	SPKS1	SPKS0
Beep on	0	0
Short beep	0	1
Normal beep	1	0
Long beep	1	1

2.13 RESET: Reset Button

Press “RESET” button will activate a reset function.

CHAPTER 3

Initial Setup

This chapter shows how to initial the UNO-2050, sections include:

Sections include:

- Insert CompactFlash Card
- Chassis grounding
- Connect the Power
- Plug-in Screw Terminal Block Field Wiring Considerations
- BIOS Setup and System Assignments

3.1 Insert CompactFlash Card

The procedure for installing a CompactFlash™ card into the UNO-2050 is as follows, please follows these steps carefully.

Step 1: Remove power cord.

Step 2: Unscrew four screws from the rear panel of the UNO-2050.

Step 3: Remove the rear panel.

Step 4: Plug a CompactFlash™ card with user's OS and application program into a CompactFlash™ card slot on board.

Step 5: Screw back the rear panel with four screws.

3.2 Chassis Grounding

The UNO-2050 housing is aluminum material that provides good EMI protection and a stable system grounding base. There is an easy-to-connect chassis grounding point for you to connect to the "Earth." Users can select if connecting power grounding with chassis grounding with an onboard jumper selection.

Please connect chassis ground of UNO-2050 with "EARTH" as GROUND.

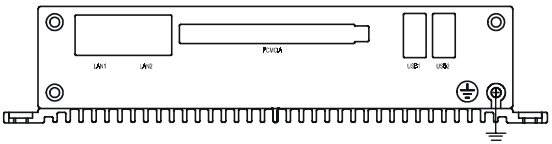
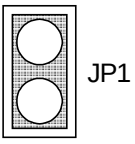


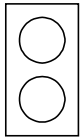
Figure 3-1: Chassis Grounding connection

UNO-2050 has on-board jumper JP1 to select if connecting chassis ground with system's power ground.

Connecting chassis ground with system power ground: (Default)



Not connecting chassis ground with system power ground:



3.3 Connect the Power

Connect the UNO-2050 to a 9 ~ 36 V_{DC} power source. The power source can either be from a power adapter or an in-house power source.

3.4 Plug-in Screw Terminal Block Field Wiring Considerations

There are several I/O interfaces use a plug-in screw terminal block for the interface between I/O modules and field devices.

The following information must be considered when connecting electrical devices to I/O modules.

1. The terminal block accepts wires from 0.5 mm to 2.5 mm.
2. Always use a continuous length of wire. Do not combine wires to make them longer.
3. Use the shortest possible wire length.
4. Use wire trays for routing where possible.
5. Avoid running wires near high-energy wiring.
6. Avoid running input wiring in close proximity to output wiring where possible.
7. Avoid creating sharp bends in the wires.

3.5 BIOS Setup and System Assignments

UNO-2050 adopts Advantech SOM-2353 CPU module. For UNO-2050 BIOS setup and system assignments, you can refer to SOM-2353 Chapter 4 “Award BIOS Setup” and Appendix A “System Assignments” for detailed information. The SOM-2353 user’s manual is located under “Manual” folder on the CD-ROM.”

Please note that you can try to “LOAD BIOS DEFAULTS” from BIOS Setup manual if the UNO-2050 does not work properly.

3.6 HDD Extension Flexibility

Although UNO-2050 is an embedded platform, there is reserve flexibility to install one 2.5” HDD. Some customers want to install a popular operating system, like Windows NT/2000 or need for larger data storage capability. UNO-2050 is also an ideal platform for applications with HDD demand. Please contact Advantech to purchase UNO-2050's HDD extension kit.

APPENDIX A

Pin Assignments

This appendix gives the UNO-2050 pin assignments

- Board Connectors and Jumpers
- Standard RS-232 Serial Port
- Isolated 5-wire RS-232/422/485 Serial Port
- Ethernet RJ-45 Connector
- Phoenix Power Connector
- PS/2 Keyboard and Mouse Connector
- VGA Display Connector
- CompactFlash™ Master/Slave Jumper Setting
- Enhanced IDE connctor
- LCD connector (Reserved)
- Audio connector (Reserved)

A.1 Board Connector and Jumpers

There are connectors and jumpers on the UNO-2050 board. The following sections tell you how to configure the UNO-2050 hardware setting. Figure A-1 and figure A-2 show the locations of UNO-2050 connectors and jumpers.

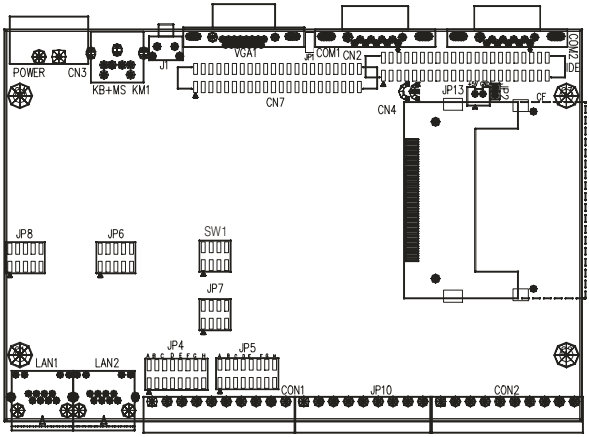


Figure A-1: UNO-2050 connector and jumper locations (Top View)

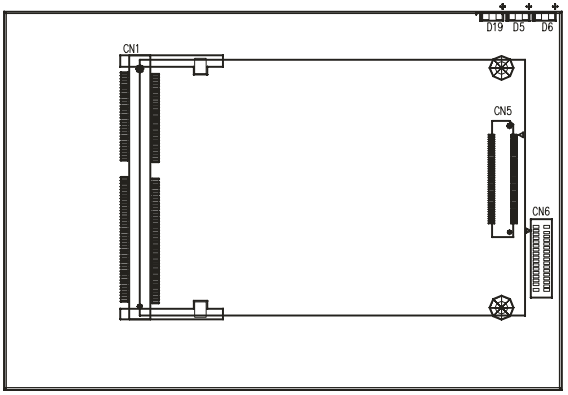


Figure A-2: UNO-2050 connector and jumper locations (Bottom View)

Table A-1: UNO-2050 connectors and jumpers	
CN2	Internal IDE connector
CN3	Phoenix power connector
CN4	Internal CompactFlash card slot
CN5	LCD input from SOM-2353 CN1
CN7	LCD connector (reserved)
COM1	COM1 standard RS-232 serial port
COM2	COM2 standard RS-232 serial port
CON1	COM3 and COM4. Isolated 5-wire RS-232/422/485 serial connector
CON2	Isolated digital output connector
D5	Power IDE LED
D6	Power LED
D19	Diagnostic LED
J1	Reset button
JP1	System grounding mode
JP2	CompactFlash IDE Primary Master/Slave jumper
JP4	COM3 5-wire RS-232/422/485 selection
JP5	COM4 5-wire RS-232/422/485 selection
JP7	RS-422/485 terminal resistor setting
JP10	Isolated digital input connector
JP12	Digital output power on configuration
KM1	PS/2 keyboard and mouse connector
LAN1	Ethernet RJ-45 connector
LAN2	Ethernet RJ-45 connector
SW1	RS-485 auto flow control mode and RS-422 master/slave mode selection
VGA1	VGA DB-15 connector

A.2 Standard RS-232 Serial Port (COM1~C0M2)

Pin Assignments

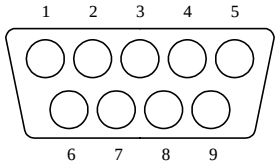


Table A-2: RS-232 serial port pin assignments

Pin	RS-232 Signal Name
1	DCD
2	RxD
3	TxD
4	DTR
5	GND
6	DSR
7	RTS
8	CTS
9	RI

A.3 Isolated 5-wire RS-232/422/485 Serial Port (COM3 ~ COM4)

Pin Assignments

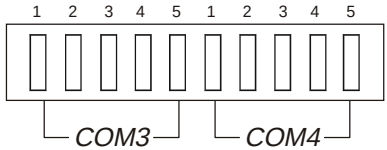


Table A-3 Isolated 5-wire RS-232/422/485 serial port pin assignments

Pin	5-wire RS-232 Signal Name	RS-422 Signal Name	RS-485 Signal Name
1	RxD	TxD+	DATA+
2	TxD	TxD-	DATA-
3	RTS	RxD+	NC
4	CTS	RxD-	NC
5	GND	GND	GND

Note: NC represents “No Connection.”

RS-232/422/485 Selection

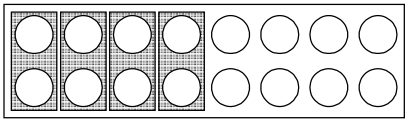
COM3 and COM4 support 5-wire RS-232, RS-422 or RS-485 interfaces, and you can set corresponding jumpers to select serial ports as RS-232 or RS-422/485 interfaces shown in Table A-4.

The system detects RS-422 or RS-485 signals automatically in RS-422/485 mode.

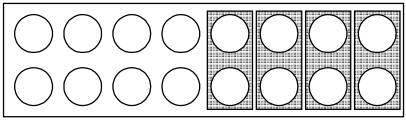
Table A-4: Jumpers to select 5-wire RS-232/422/485

Serial Port	Corresponding jumper to select RS-232/422/485
COM3	JP4
COM4	JP5

Jumper setting for RS-422/485 interface: (Default setting)



Jumper setting for RS-232 interface:



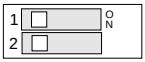
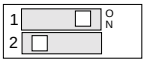
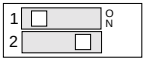
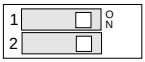
RS-485 Auto Flow Control Mode and RS-422 Master/ Slave Mode Selection

You set the “Auto Flow Control” mode of RS-485 or “Master/Slave” mode of RS-422 by using SW1 DIP switches for each RS-422/485 port.

In RS-485, if the switche is set to "Auto", the driver automatically senses the direction of the data flow and switches the direction of transmission. No handshaking is necessary.

In RS-422, if DIP switche is set to "On," the driver is always enabled, and always in high or low status.

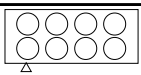
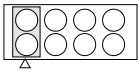
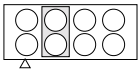
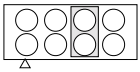
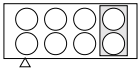
Table A-5: RS-485 auto flow control mode and RS-422 master/slave mode selection

SW1 DIP switch setting	Description
	COM3 RS-485: Auto flow control; RS-422: Slave mode
	COM4 RS-485: Auto flow control; RS-422: Slave mode
	COM3 RS-485: N/A; RS-422: Master mode
	COM4 RS-485: Auto flow control; RS-422: Slave mode
	COM3 RS-485: Auto flow control; RS-422: Slave mode
	COM4 RS-485: N/A; RS-422: Master mode
	COM3 RS-485: N/A; RS-422: Master mode
	COM4 RS-485: N/A; RS-422: Master mode

Terminator Resistors Setup for RS-422/485

The 120Ω terminal resistors for impedance matching on the UNO-2050 are installed on board by selecting jumper JP7. Each terminal resistor corresponds to different channels for RS-422/485 signal lines. Usually, these resistors are needed for both ends of the communication wires and the value of the resistors should match the characteristic impedance of the wires used.

Table A-6: JP7 RS-422/485 terminal resistor setting

JP7	Enable Pins
	Default setting - No terminal resistors
	COM3 Pin1 and Pin2 connect with 120Ω terminal resistors
	COM3 Pin3 and Pin4 connect with 120Ω terminal resistors
	COM4 Pin1 and Pin2 connect with 120Ω terminal resistors
	COM4 Pin3 and Pin4 connect with 120Ω terminal resistors

RS-485 Signal Wiring

The RS-485 standard supports half-duplex communication. This means that just two wires are needed to both transmit and receive data. Handshaking signals (such as RTS, Request To Send) in RS-232 are normally used to control the direction of the data flow and to switch the transmission accordingly. In RS-485 mode, the UNO-2050 automatically senses the direction of the data flow and switches the transmission direction - no handshaking is necessary. This means a user can build an RS-485 network with just two wires. This RS-485 control is completely transparent to the user. The software written for half duplex RS-232 works without the need for any modification.

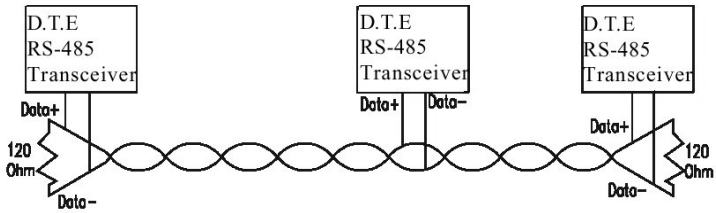


Figure A-3: RS-485 Wiring topology

A.4 Ethernet RJ-45 Connector (LAN1~LAN2)

Ethernet RJ-45 Connector Pin Assignments

Table A-7: Ethernet RJ-45 connector pin assignments

Pin	10/100Base-T Signal Name
1	XMT+
2	XMT-
3	RCV+
4	NC
5	NC
6	RCV-
7	NC
8	NC

A.5 Phoenix Power Connector (CN3)

Phoenix Power Connector Pin Assignments

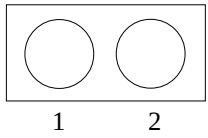


Table A-8: Phoenix power connector pin assignments

Pin	Signal Name
1	+10~30 V_{DC}
2	GND

A.6 PS/2 Keyboard and Mouse Connector (KM1)

PS/2 KB/MS Connector Pin Assignments

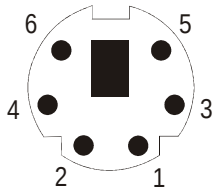


Table A-9: Keyboard and Mouse connector pin assignments

Pin	Signal Name
1	KB DATA
2	MS DATA
3	GND
4	VCC
5	KB CLOCK
6	MS CLOCK

A.7 VGA Display Connector (VGA1)

VGA Connector Pin Assignments

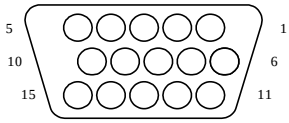


Table A-10: VGA adaptor cable pin assignments

Pin	Signal Name	Pin	Signal Name
1	RED	9	NC
2	GREEN	10	GND
3	BLUE	11	NC
4	NC	12	NC
5	GND	13	H-SYNC
6	GND	14	V-SYNC
7	GND	15	NC
8	GND		

Chipset

The UNO-2050 uses a Cyrix CS5530A chipset for its SVGA controller. It supports interlaced and non-interlaced analog monitors (color and monochrome VGA) in high-resolution modes while maintaining complete IBM VGA compatibility. Digital monitors (i.e. MDA, CGA and EGA) are NOT supported. Multiple frequency (multisync) monitors are handled as if they were analog monitors.

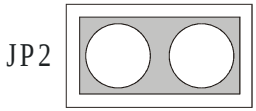
Display memory

With 1 ~ 4 MB share memory, the VGA controller can drive CRT displays or color panel displays with resolutions up to 1024 x 768 at 64 K colors. For 1024 x 768 color resolution, the display is expanded to 4 MB in BIOS.

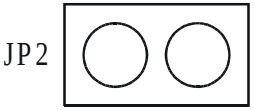
A.8 CompactFlash™ Master/Slave Jumper Setting (JP2)

The CompactFlash interface uses a primary IDE channel, which could be set as the master or slave device by changing the setting of JP2.

Master Device: (Default)



Slave Device:



UNO-2050 has one internal CompactFlash card slot and one external CompactFlash card slot. Internal CompactFlash card slot supports CompactFlash type I (3mm thick) only and External CompactFlash card slot supports both Type I and type II (5mm thick) cards

A 32 MB CompactFlash card is equipped in the UNO-2050CE with Windows CE .NET OS. For UNO-2050, there is no CompactFlash card on the slot. UNO-2050 also supports IBM Microdrive storage device, which is an ultra-miniature hard disk from IBM that was introduced in 1998. The Microdrive is built into a Type II CompactFlash form factor.

Note: *Currently, Windows CE .NET v4.0/4.1 can't detect slave device. Please kindly avoid using slave device under the Windows CE OS.*

A.9 Enhanced IDE connctor (CN2)

Table A-11: IDE hard drive connector

Pin	Signal Name	Pin	Signal Name
1	IDE RESET	2	GND
3	DATA 7 (*2)	4	DATA 8 (*2)
5	DATA 6 (*2)	6	DATA 9 (*2)
7	DATA 5 (*2)	8	DATA 10 (*2)
9	DATA 4 (*2)	10	DATA 11 (*2)
11	DATA 3 (*2)	12	DATA 12 (*2)
13	DATA 2 (*2)	14	DATA 13 (*2)
15	DATA 1 (*2)	16	DATA 14 (*2)
17	DATA 0 (*2)	18	DATA 15 (*2)
19	SIGNAL GND	20	N/C
21	DMA REQUEST	22	GND
23	IO WRITE (*2)	24	GND
25	IO READ (*2)	26	GND
27	IO CHANNEL READY	28	GND (*1)
29	HDACK	30	GND
31	IRQ	32	N/C
33	ADDR 1	34	N/C
35	ADDR 0	36	ADDR 2
37	HARD DISK SELECT 0 (*2)	38	HARD DISK SELECT 1 (*2)
39	IDE ACTIVE	40	GND
41	VCC	42	VCC
43	GND	44	N/C

A.10 LCD connector (CN7, Reserved)

Table A-12: LCD connector

Pin	Signal Name	Pin	Signal Name
1	NC	2	NC
3	GND	4	GND
5	+5V	6	+5V
7	NC	8	GND
9	+3.3V	10	+3.3V
11	PD0	12	PD1
13	PD2	14	PD3
15	PD4	16	PD5
17	NC	18	NC
19	PD6	20	PD7
21	PD8	22	PD9
23	PD10	24	PD11
25	NC	26	NC
27	PD12	28	PD13
29	PD14	30	PD15
31	PD16	32	PD17
33	GND	34	GND
35	FSCLK	36	FVSYNC
37	ENDISP	38	FHSYNC
39	FPEN	40	VBIASEN
41	NC	42	NC
43	GND	44	+5V

GND

Ground

PD0~PD17

Flat Panel Data Port Lines 17 to 0. This is the data port to an attached active matrix TFT panel.

FSCLK

Flat Panel Clock. This is the clock for the flat panel interface.

FVSYNC

Flat Panel Vertical Sync Output. This is the vertical sync for an attached active matrix TFT flat panel. This represents a delayed version of the input flat panel vertical sync signal with the appropriate pipeline delay relative to the pixel data.

FHSYNC

Flat Panel Horizontal Sync Output. This is the horizontal sync for an attached active matrix TFT flat panel. This represents a delayed version of the input flat panel horizontal sync signal with the appropriate pipeline delay relative to the pixel data.

FPEN

Flat Panel Display Enable Output. This is the display enable for an attached active matrix TFT flat panel. This signal qualifies active pixel data on the flat panel interface.

ENDISP

Display Enable Input. This signal qualifies active data on the pixel input port. It is used to qualify active pixel data for all display modes and configurations and is not specific.

VBIASEN

Flat Panel Backlight Enable Output. This is the enable signal for the backlight power supply to an attached flat panel. It is under control of the power sequence control logic.

A.11 UNO-2050 Control Register

Table A-13: UNO-2050 control register

Base Address		7	6	5	4	3	2	1	0
Base+00H	R	Isolated Digital Input Status Register							
		DI7	DI6	DI5	DI4	DI3	DI2	DI1	DI0
Base+01H	R/W	Isolated Digital Output Control/Status Register							
		DO7	DO6	DO5	DO4	DO3	DO2	DO1	DO0
Base+02H	R/W	Interrupt Enable Control/Status Register							
								DI1EN	DI0EN
Base+03H	R/W	Interrupt Triggering Edge Control/Status Register							
								DI1TE	DI0TE
Base+07H	R/W	Interrupt Flag/Clear Register							
						CTR1F	CTR0F	DI1F	DI0F
Base+08H	R/W	82C54 Chip Counter0 Register							
Base+09H	R/W	82C54 Chip Counter1 Register							
Base+0BH	R/W	82C54 Chip Control Register							
Base+0CH	R/W	Counter0 Start Control / Output Status Register							
					CTR0Out				CTR0Gate
Base+0DH	R/W	Counter1 Start Control / Output Status Register							
					CTR1Out				CTR1Gate
Base+0EH	R/W	Counter0 Setting Register							
						CTR0IntSet	CTR0OutSet	CTR0GateSet	CTR0CLKSet
Base+0FH	R/W	Counter1 Setting Register							
			CTR32Set	S1	S0	CTR1IntSet	CTR1OutSig	CTR1GateSig	CTR1CLKSig
Base+10H	R/W	LED Control Register							
							LEDS1	LEDS0	LEDEn
Base+11H	R/W	Buzzer Control Register							
							SPKS1	SPKS0	SPKEn